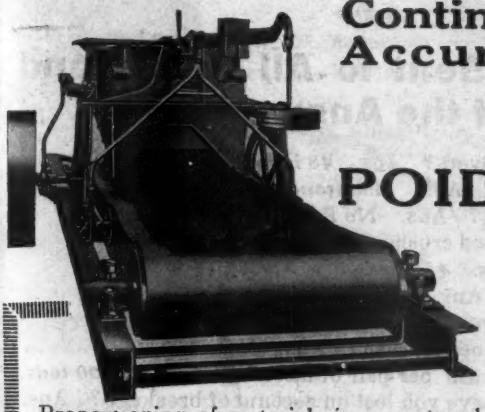
Pit and Quarry

SAND · GRAVEL · STONE

HANDLING · CRUSHING · SCREENING · WASHING

V. II : 10



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Proportioning of materials is correct and automatic. The weight on the middle roller actuates the scale beam and controls the gate opening, so that the exact amount of material is liberated to maintain a uniform weight on the roller. Easy to install. Feeds from bin, elevator or conveyor. Cannot clog in hopper. Bearings dustproof. Liquid measure attachment gives a mixture of any desired consistency.

The POIDOMETER is explained in detail in Bulletin No. 5. Send for a copy.

The Schaffer Engineering and Equipment Co. Tiffin, Ohio

SEPTEMBER, 1918

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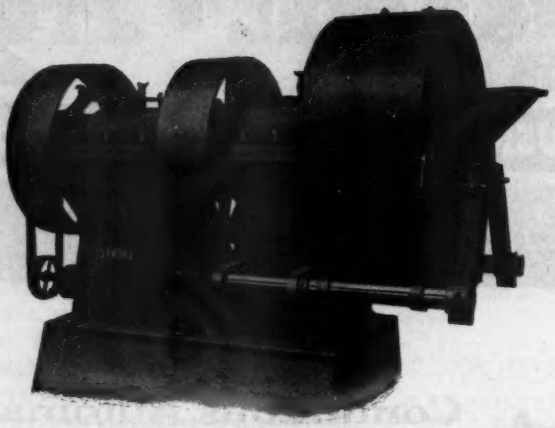
SYMONS DISC CRUSHER



READY FOR IMMEDIATE DELIVERY

Questionnaire Sent to All Users, and One of the Answers

Q. Size crusher this report covers? Ans. *48 inch.*
Q. Kind of material crushed? Ans. *Limestone.*
Q. What moisture in material? Ans. *No Record.*
Q. How long have you operated crusher? Ans. *3 years.*
Q. What is size of feed? Ans. *4 inches.*
Q. What is size of product? Ans. *1½ inch.*
Q. What horsepower does it require? Ans. *65.*
Q. How many tons per hour does it crush? Ans. *80 to 100.*
Q. How many tons do you crush per pair of discs? Ans. *750,000 tons.*
Q. What percentage of time have you lost on account of breakage? Ans. *None.*
Q. Give your opinion of this crusher as compared to rolls. Ans. *Would not use rolls.*
Q. Give your opinion of this crusher as compared to a jaw crusher. Ans. *Superior to Jaw crusher.*
Q. Give your opinion of this crusher as compared to a Gyratory crusher. Ans. *Superior to Gyratory crusher.*

Signed *Name on Request.*

Many more like this, also reports of the success of the crusher on different kinds of material.

Also built in sizes 18 in., 24 in. and 36 in.

Manufactured and Sold Only by

Chalmers & Williams

CHICAGO HEIGHTS, ILL.

Pit and Quarry

Vol. 2 Chicago, Ill., September, 1918 No. 10

Three Great Southern Quarries

The Crushing Plants of W. W. Boxley & Company in Virginia Now Taken Over by the Government.

WAR WORK in the South has prompted the Government to take over the quarries of W. W. Boxley & Company, Roanoke, Va., whose crushing plants are located at Blue Ridge, Pembroke, and Pounding Mills, Va. This firm is one of the largest contractors in the country, and its quarries are the outgrowth of the contracting business, having been developed one at a time as needed.

The possibility of always having on hand ample supplies of stone for the firm's own work was, of course, the main reason for opening and operating these quarries. Material was also sold to many customers, and while the volume of this business has been extensive, it has always been secondary to the purpose first named. The firm some time ago took its own men into partnership and the quarry department has been successful from the first. All of the plants are of similar design, and the one at Blue Ridge is selected here for description.

The country is quite hilly and, as far as possible, gravity has been made use of. The quarry face is about 2,500 feet long and ranges in height from 15 to 50 feet. There is some top soil, which is stripped and deposited on the far slope out of the way of future operations. A high average is maintained in drilling the 6-inch blast holes, a Keystone and a Clipper drill being used, maintaining an average of 80 feet per day. On one occasion one of the drills made a record of 46 feet 6 inches in one day's run.

Large blasts are used to break down the face, for the company believes that better results are obtained with 50 and 60 per cent Du Pont gelatine dynamite. A very successful "break" was recently made with 8,000 pounds of dynamite.

Crushing and Screening System.

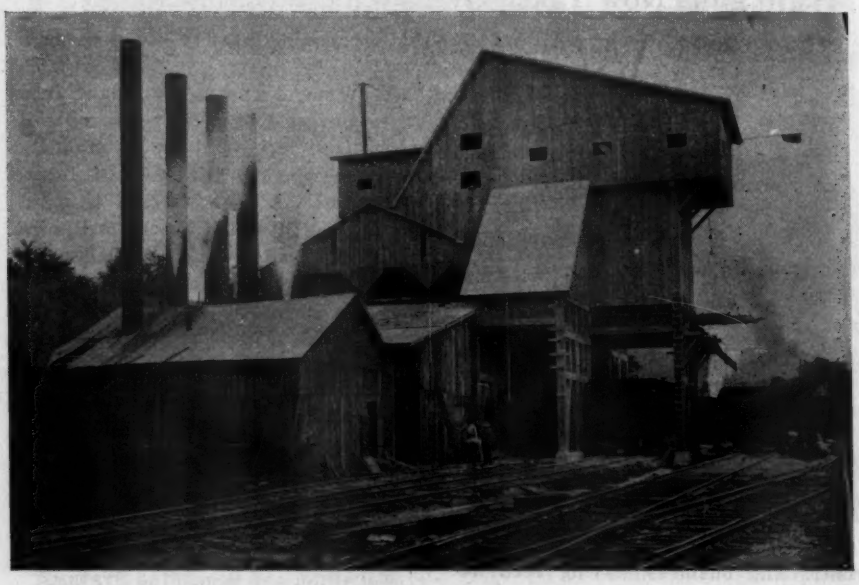
The method of handling and conveying the rock to the crushing plant, half a mile away from the quarry, is by loading 6-yard dump cars with a No. 61 Marion steam shovel, the cars being pulled by engines in trains of, usually, six cars. These are run over a hopper at the plant which feeds to a No. 12 Allis-Chalmers gyratory crusher, requiring about 56 seconds for one carload of stone to pass through to other crushers, Nos. 8 and 4, also of Allis-Chalmers make. These and the screening equipment produce five grades of stone, as follows: No. 1, 2-inch; No. 2, 1-inch; No. 3, ¾-inch; No. 4, that retained on a ½-inch mesh

screen; and No. 5, screenings. There is bin storage capacity for all of these grades.

A belt conveyor carries the stone from the No. 12 crusher to the No. 1 screen. The tailings go into the No. 8 crusher and are run through the No. 2 screens. There is an additional screen plate with ½-inch mesh attached to the outside of each of these screens, catching the first run passed through the larger screen, taking the screenings and dirt off at first. The screenings go to bins by means of belt conveyors and are used for road dressing.

The crushing plant is located on the main line of the Norfolk and Western Railway and has a large car storage yard above the plant and on such a grade that the cars can be let down to the loading bins by gravity alone. The hoppers are built out over two derricks and spout to a third, making it possible to load six cars at one time. This system eliminates cable or other haulage. Sixty to 75 cars can be stored in the yard, so that if car conditions were normal the plant's capacity of 50 cars per day could be supplied continuously and without delay.

In case a large spawl becomes lodged in the hopper above the big crusher, an ingenious arrangement consisting of an air hoist fitted with a grab hook overcomes this by catching the stone and turning it until it is dislodged.



The Boxley Crushing Plant at Blue Ridge. View from the North-Western Main Line, showing Loading Tracks taking the Stone from the Bins.

The power plant includes one 125-hp. and one 150-hp. Allis-Chalmers Corliss engine, air compressor, and a bank of four 125-hp. boilers. Gravity has also been utilized in handling coal, which is dropped from cars on a trestle above the boiler room into hopper bins which chute it directly to the doors of the boilers.

It is necessary for the company to maintain a commissary, which also furnishes nearby farmers with groc-

Model 61 Marion Shovel at the Boxley Quarry, Blue Ridge, Va., Loading Into Six-Yard Standard-Gauge Cars.

eries, dry goods and other supplies. Single men live in barracks and eat in a dining-hall, but cabins are provided for married men.

J. B. Dunklin is superintendent of the quarry work of the Boxley Company and from his thirty-five years' experience have come the ideas incorporated into the Boxley plants.

Furnace Flux Passes Record.

The production of limestone used for flux in the United States, aggregating 25,367,428 long tons and valued at $18,507,985, greatly surpassed even the record production of 1916—an increase of 1,743,920 long tons, or 7 per cent, in quantity and of $4,561,103 in value. These increases followed increases of 24 per cent in quantity and 44 per cent in value in 1916, and 24 per cent in quantity and 23 per cent in value in 1915. The average price in 1917 was 73 cents a long ton, compared with 59 cents in 1916, and 51 cents in 1915.

This View shows the Track coming from the Quarry around the Mountain and dumping into the Crusher.

Cost-Keeping for Quarries

BY DANIEL J. HAUER, C. E.

(THE FIFTH OF A SERIES OF ARTICLES ON COST-KEEPING. THIS ARTICLE DEALS WITH THE APPLICATION OF OVERHEAD COSTS, A MOST IMPORTANT BRANCH OF THE SUBJECT.)

OVERHEAD COSTS to be of greatest value should be applied to the cost records daily. Unfortunately few quarrymen do this, but instead keep overhead charges in with their regular bookkeeping, applying them to their costs at the end of each month or season. This is some help and is better than ignoring such costs, but if sales have been made with overhead costs figured too low, to know such a fact at the end of a month or season is to be wise too late. Know costs before fixing a selling price.

IT IS a comparatively easy matter to keep overhead costs, and a general outline of the various items was given in the fourth article of this series in PIT AND QUARRY for June, but it is rather difficult to apply such costs upon a unit basis to daily cost records.

It has already been pointed out that in some quarries not only must the overhead charges be treated as will be outlined, but some of the field costs must also be handled in the same manner. This is true of development costs, for it is evident that such costs must be applied over a future output that may run for some years. If stripping is only done once a year, or even less frequently, then the cost of stripping must also be prorated over the future output. Some other items, as pumping and plant charges, may also have to be treated in the same manner.

APPLYING OVERHEAD FIELD COSTS.

Such costs can be applied either upon a cubic yard or ton basis. Reference has already been made to laying out the quarry, but this will be dealt with in the next article of this series. Suffice it to say that the yardage in the quarry can be figured from this layout and from this yardage the number of tons can be calculated for any given section of the quarry.

To illustrate: If $10,000 is expended to develop a new quarry and it is estimated that this part of the quarry contains 1,000,000 tons, then there is a fixed overhead charge for this item, for every ton of rock produced, of one cent. If the stripping is done for a season over a part of the quarry containing 50,000 tons at a cost of $500, then again for this fifty thousand tons there is a charge of one cent. So on with the other items of overhead field costs. The overhead cost sheet should have such costs worked out and shown upon it, so that it can be applied to the daily cost or analysis sheets.

In considering the plant charges, a distinction must be made between the original plant cost and installation and the repairs and renewals. Thus there should be two charges for plant. The first one is the yearly charge for interest and depreciation on the original cost of the crusher and quarry plant, which should be based upon the yearly output of the quarry, estimated or taken from the records of the previous seasons. The second is the cost of repairs and renewals. This last item should include all special labor engaged for the purpose, or any wages of men regularly employed if they are used for this purpose only, but should not include the wages of regular men such as blacksmith and engineer, as these men should be included in the regular field costs. That is, if the

quarry is shut down and the engineer and blacksmith are used to repair old or install new machinery, then their labor should be charged, but if a breakdown occurs and these men take an hour to do the repair work their labor is included in the regular field costs.

If included in the repairs and renewals there is the installation of additional machinery, as a boiler or crusher, then this should be added to the capital charge and will come under and be included in the first item of plant charges. The rest of the minor charges are listed on the overhead sheet and the cost proportioned on the monthly output on a unit basis.

If several products are produced in one quarry then the plant charges for each operation or product should be kept separate and the charge figured out on the overhead sheet so that it can be applied to each product on a unit basis.

OVERHEAD OFFICE CHARGES.

The plant charge can be handled as a direct one against the product, but the general overhead charge can only be a direct one when only one product is manufactured, or if more than one, when they are of the same value and produced in equal quantities. Should more than one product be produced and neither the values nor quantities be equal, then it becomes necessary to prorate the overhead charges upon the proper percentage. This all sounds very easy, but at times it becomes quite a complex problem.

It will be well to illustrate this by some examples. Thus, if a quarry produces two sizes or kinds of building stone, of about equal amounts, the total overhead charges may be divided in half and each sum divided by the total tonnage of each class of stone.

On the other hand, when building stone, crushed stone, lime and hydrated lime are produced in varying quantities, the value of each or the selling price must first be considered. In such case the entire value of these products represents 100 per cent. Then each product is figured on the percentage basis, preferably on the value of the total product. Thus 100,000 tons of stone at $1.25, building stone to the amount of 50,000 tons at $1.00 and so on. Then, if the crushed stone product figures 38 per cent of the total valuation, the same percentage of the total overhead charges becomes applicable to the crushed stone. This amount divided by the total tonnage gives a unit cost that can be applied daily. These costs are as nearly true ones as can be obtained, yet if such costs are only figured up at the end of the season, the same objection previously given can be made against them.

However, at the beginning of a sea-

Linking Up the Lincoln Highway.

The Lincoln Highway Association has suggested a great border highway to follow roughly the coast lines east and west and the north and south borders. The military value of such a highway speaks for itself. Across the continent from New York to San Francisco runs the great Lincoln Highway; the Santa Fe Trail from Kansas City to San Bernardino; the Dixie Highway from Chicago to Miami, Florida; the Jefferson Highway from Winnipeg to New Orleans; the Columbia Highway from Portland to Salt Lake City; and the Yellowstone Trail, cutting across Wyoming and Montana and connecting the Lincoln Highway with the Northern Border Highway, would provide a principal system of strategic highways that would serve as the groundwork for a really co-ordinative system of roads.

And the beauty of such a system is that, though it would have military value, its value wouldn't be solely military. In time of peace such a system would do more than anyone could view to make this one country.

—William Almon Wolff, in Collier's Weekly.

son or of the year it may be found that there has been little if any expense charged against the overhead. So to begin each season or year it is necessary to use the figures compiled at the end of the previous season. This may be done for the first month, after which the figures compiled from the current expense can be substituted. Then at stated periods the total expenses charged against overhead can be compiled and prorated on the unit basis against each product. In that way, as the season advances, each week or each month the overhead becomes more exact, and soon actual results are obtained instead of averages or estimates.

Contrast this with the procedure of many quarry owners, who apply averages made up either monthly, semi-annually or at the end of a season. For five or six different products totaling 250,000 tons produced and with total overhead charges of $50,000, the average overhead charge per ton is twenty cents. Figured as above illustrated, where the crushed stone is 217,000 cubic yards and its value is 52 per cent of the total valuation of the quarry products, the overhead charge becomes twelve cents. For the second product, with a tonnage of 150,000, the percentage of value being 18, the overhead charge per ton becomes 60 cents. The third product has a tonnage of 9,500, the percentage of value being 15, thus giving an overhead charge of 79 cents. The fourth product gives an overhead charge of 83 cents, the percentage of valuation being 10 and the tonnage 6,000. The fifth has a tonnage of 2,500, a percentage of 5, making the overhead one dollar per ton. An average overhead of twenty cents per ton would mean trouble from start to finish. Here the selling price might be fixed upon a basis of the overhead being 20 cents per ton, while for four of the products it is much higher, from three to five times as much. On the other hand, the overhead on the crushed stone is placed too high, really allowing a smaller selling price if necessary to meet keen competition.

It is hoped that these methods of recording costs are made clear. The bookkeeping end of it is not difficult, but the cost-keeping, which should only be supplemental to bookkeeping, is quite complex and must be studied out with great care.

Production of Gypsum.

The quantity of crude gypsum mined in the United States in 1917 (2,696,226 tons), according to a report just issued by the U. S. Geological Survey, was slightly less than that mined in 1916, owing largely to a reduction in building operations in the last quarter of the year. The output nevertheless exceeded that of any year previous to 1916.

On the other hand, the total value of the crude and calcined gypsum produced in the United States in 1917 far surpassed that of any other year. In 1916, for the first time, the total value of gypsum products of the United States in a single year exceeded $7,000,000, but in 1917 they amounted to $10,495,343. The increase in 1917 was $2,536,311, or 32 per cent over the total value in 1916, as compared with an increase of $3,000,000 in the ten years from 1907 to 1916.

The increase in value was due to increased cost of production, including higher wages and higher cost of supplies. As a whole, the gypsum business was in excellent condition during the first eight months of 1917, but declined notably in the last quarter. Gypsum was produced in eighteen States and in Alaska. In 1917, as in former years, New York was the largest producer of raw gypsum, Iowa ranked second, and Michigan third.

ASSOCIATION ACTIVITIES

Coöperating with Uncle Sam.

War Service Body of the Sand, Gravel and Stone Operators to Be Known as the Committee on Mineral Aggregates—Materials to Be Given Priorities in Accordance with Utilization.

NEARLY a hundred stone men and somewhat over that number of sand and gravel operators attended the conference called by the War Industries Board to meet in Washington on August 14. Every section east of Kansas City was represented. The call for this conference was issued by R. L. Humphrey, chief of the building materials section, who, as representative of the War Industries Board, opened the deliberations and directed the procedure. The result was the selection of a War Service Committee, approved by the War Industries Board, and to be known officially as the "Committee on Mineral Aggregates." This committee will consist of one member from each of seventeen designated districts, and will act in an advisory and informative capacity, as indicated in the report which follows. Its concern will be with stone, sand, gravel and slag as used in concrete work, road work and ballast, but not with stone as used in agriculture, in the manufacture of steel, sugar or soda ash or in nitrate plants, these uses being already fully established on a preferential basis by the Priorities Division of the War Industries Board.

War Service Committees.

WHAT furnishes a better groundwork to foster co-operative association than these committees? Industries torn apart for years by factional differences have been brought together in the committees and are working with one another in the closest harmony. Allied industries in some instances for the first time in their history have found a common meeting point. Business quarrels have been forgotten. Competition has been put on a clean and enduring basis.—Harry A. Wheeler, President of the Chamber of Commerce of the United States.

Details of the Conference

The conference was called to order at 10:30 a. m. on August 14, by Mr. Humphrey, who called for the election of a chairman and secretary. A. J. Blair, of Milwaukee, who was nominated by E. C. Dunbar, of Detroit, was elected chairman, and E. G. Sutton, of Indianapolis, secretary of the National Association of Sand and Gravel Producers, was, on nomination by A. P. Sandles, elected secretary of the conference.

A request, agreed to by both the stone men and the sand and gravel men present, that separate organizations be formed of each of these two industries, was declined by Mr. Humphrey, who suggested that the country be divided into seven districts, one sand and gravel man and one stone

man from each district to be selected for service on a committee to be thus formed.

On motion A. J. Blair, of Milwaukee, as representing the crushed stone industry, and Harry Donnelly, president of the National Association of Sand and Gravel Producers, were each authorized to select five men to serve on a committee of ten to group the country by districts and report to the general conference.

In accordance with this motion Mr. Blair named E. J. Krause, of St. Louis; John Rice, Easton, Pa.; L. H. Hawblitz, Toledo; A. S. Holmes, Chattanooga, and John Prince, Kansas City. Mr. Donnelly named Walter Jahncke, New Orleans; E. Le Roy Lane, Boston; J. H. Allen, Lincoln, Neb.; Guy C. Baker, Greenville, O., and Parker M. Lewis, Chicago.

This report was approved. Mr. Humphrey, however, stated that after consideration he had decided that a greater number of districts was advisable and that only one man, representing both industries, be named for each district. He asked that the committee proceed at once to group the country into districts on this basis.

The committee later reported, recommending that the country be divided into seventeen districts or groups with a group chairman for each district. The report of the committee was approved by the conference and also assented to by Mr. Humphrey. The group chairmen, who make up the new War Service Committee, and the groups as constituted are as follows:

WAR SERVICE GROUP CHAIRMEN.

1. New England States. Chairman, B. D. Pierce (stone).

2. Metropolitan New York, comprising the territory within the free lighterage limits of New York. Chairman, Jas. G. Shaw (stone).

3. Metropolitan Philadelphia, comprising the territory in New Jersey south of and including Trenton, Pennsylvania east of and including Harrisburg, and the state of Delaware. Chairman, Geo. D. Van Sciver (sand and gravel).

4. States of New York and Pennsylvania outside of the metropolitan districts of New York and Philadelphia. Chairman, J. H. Rogers (sand and gravel).

5. Maryland, District of Columbia, and the State of Virginia north of but not including Fredericksburg. Chairman, Joseph J. Hock (sand and gravel).

6. West Virginia, North Carolina and Virginia, south of and including Fredericksburg. Chairman, W. F. Shaffner (stone).

7. Kentucky, Tennessee, Northern Alabama, Northern Mississippi. Chairman, W. S. Holmes (stone).

8. South Carolina, Georgia and

ALL TOGETHER.

Two million men have been called to the colors. We must back them up, or their sacrifices are in vain.

With these men taken out of industry, we who remain must work with greater energy and produce in greater abundance. Every added effort is a blow at the enemy.

Self-Interest Must Be Forgotten.

Now is the time for unity of action. We can do our part, right where we are, by striving for larger production and greater efficiency.

We can back up our "Boys" and help our Government if we

WORK HARDER

Florida. Chairman, A. P. Burke (sand and gravel).

9. Southern Alabama, Southern Mississippi, Louisiana and Texas. Chairman, W. D. Jahncke (sand and gravel), New Orleans, La.

10. State of Wisconsin south of and including Moline, State of Illinois north of and including Joliet, State of Indiana north of and including Crown Point. Chairman, P. M. Lewis (sand and gravel).

11. Ohio and Southern Michigan. Chairman, G. A. France (stone and slag).

12. Indiana south of Crown Point, Illinois south of Joliet, Missouri east of and including Des Moines. Chairman, G. V. Miller (sand and gravel).

13. Western Missouri, Iowa west of Des Moines, Nebraska, Kansas and Oklahoma. Chairman, John Prince (sand and stone).

14. Wisconsin north of Moline, Northern Peninsula of Michigan, North Dakota, South Dakota and Minnesota. Chairman, A. J. Blair (stone). Milwaukee.

15. Montana, Wyoming, Colorado, New Mexico and Utah. Chairman, C. S. Lambie (sand and gravel).

16. Washington, Oregon and Idaho. No delegate present.

17. California, Nevada and Arizona. No delegate present.

The group chairmen as named above were, at the suggestion of Mr. Humphrey, selected by each group in caucus, the selection in many cases developing spirited contests between stone and gravel men. Immediately after the announcement of the results of the various caucuses, the men chosen met as a War Service Committee and perfected their organization by electing James G. Shaw, of New York City, as chairman, and E. G. Sutton as secretary. The sum of $10,000 was appropriated to defray the salaries of the secretary and his assistants and necessary office expense, headquarters to be in Washington, and the money to be collected from the operators throughout the country.

In closing the conference Mr. Humphrey said that each group would be expected to defray the expenses of its chairman in attending meetings of the War Service Committee and that the operators in each district would be asked to confirm the selection of the group chairman. In defining the functions of the committee he said that the body would act in an advisory capacity and as an information bureau, but would have no authority to fix prices or distribute orders. He also indicated that it would be well for all operators to come into the organization.

A session of the War Service Committee, said Mr. Humphrey, will probably be called to meet for actual work in September. In the meantime he gave the assurance that in all probability the coal supply of operators will not be curtailed during the rest of the season.

What the War Service Committee Will Do.

The exact duties of the War Service Committee have not been fully prescribed, but in the main it will act as an information bureau. Data will be collected to be presented to the War Industries Board which will form the basis for determining the degree of essentiality of the industries represented during the war period, on which will depend the distribution of fuel, labor and car supply. As soon as the desired information is available the War Industries Board will take up the question of price-fixing so far as the purchase of Government material, including railroad ballast, is concerned, together with the proper distribution of such orders. The prices determined upon may also apply on sales made to the general public. The advisability

of pooling productions will also be given consideration.

How Industries Will be Affected.

The general impression gained at the conference was to the effect that the sand, gravel, crushed stone and slag industries should be kept going so far as it is possible without seriously interfering with the conduct of the war. Statements made at the meetings by members of the War Industries Board gave encouragement for concluding that these industries would be placed on the preferred list of operations, which would mean that production would not be restricted any more than they are at present, with a possibility of improvement being made. There is little doubt but that the activities of the War Service Committee in coöperating with the War Industries Board will prove beneficial and in no wise detrimental to the industries involved.

Freight Rates.

Assurance was given by a prominent member of the Railroad Administration that a favorable decision would be given with reference to modification of General Order No. 28 within a very short time. It is expected that a modification of the order will be made such that the increase in rates on sand, gravel and stone will not exceed ten cents a ton.

Preliminary Meetings

The call for the conference issued by Mr. Humphrey included in one general invitation representation from all sand and gravel as well as crushed stone producers. It was the general feeling, however, especially among sand and gravel men, that diversity of interests made separate representation desirable, and the preliminary meetings held in preparation for the meeting with Mr. Humphrey had this in view. In Chicago two such preliminary meetings were held. The sand men met in consultation on August 7 and agreed to a division into three groups—bank sand, silica sand and general sand and gravel producers—each supplying a different demand. The stone men met on August 8, and, besides selecting E. J. Krause, of St. Louis, as their spokesman, adopted the following resolution:

"Resolved, That it is the sense of this meeting, since the markets of the allied industries of crushed stone and sand and gravel are not always parallel in that crushed stone, so far as flux, agricultural lime and other chemical uses are concerned, is an essential whose continued production cannot safely be interrupted, that the crushed stone industry should be grouped separately but that we offer to the War Industries Board our fullest coöperation in any efforts to so coördinate the two industries that the aim sought can best be attained."

Organize! Organize! Organize!

A. P. Sandles, secretary of the National Crushed Stone Association, presents the following pithy argument on the application blank of that organization. It applies with equal force to every other industry:

President McKinley's policies were mighty factors in this Republic's life. His last and greatest speech was made at Buffalo. He built upon two simple propositions which have encircled the globe, viz.:

First—Reciprocity is better than retaliation.

Second—Coöperation is better than cut-throat competition.

McKinley opposed ruinous policies that made business unsafe, bankruptcy sure, and methods that imperiled the investment of an industrious man.

This Republic is having new birth pains. A new era is here. Power roosts in Washington. Men and business must nationalize.

Uncle Sam asks industry to organize and present a spokesman. Stone men should be united to better assist in the task ahead. McKinley's creed—"Organize"—is the corner-stone.

Conference of Truck Owners

AT THIS time, when freight cars are at a premium, the development of greater efficiency in motor truck transportation is a vital factor in the saving of freight car space. Every cubic foot saved means more room for munitions and food for our men overseas. Thus the Truck Owners' Conference, to be held in Detroit this month, is a patriotic movement toward helping to win the war and as such should have hearty co-operation.

CAREFULLY matured plans for forthcoming conventions of the Truck Owners' Conference, Inc., in many of the larger cities show that this national movement is the most important ever sponsored by the industry.

As announced by Chairman Harold P. Gould, nineteen two-day conferences will be held in as many cities during the next ten months, of which the first will be in Detroit, September 19 and 20, in the Board of Commerce Building. The official program will consist of Detroit speakers, each a well-known truck expert in his particular field. Special films of a few of the more efficiently operated truck fleets in Detroit and Chicago will be shown.

Addresses by both large and small truck operators on their experiences in using methods that reduce operating expense and general discussions on the facts thereby brought out will feature all conferences. The purpose throughout is to secure greater efficiency in truck operation the country over. The subjects discussed range from "Loading and Unloading Methods that Save Time" and "Hauling More Goods with Fewer Units" to "Simplicity and Advantages of Keeping Costs on the National Standard Truck Cost System."

Everything spoken at these conferences will represent absolute knowledge on the part of experienced operators, some of whom will travel a thousand miles to give the assembly the benefit of all new and good features they have developed. The conferences are open to all interested truck users—no fee of any kind being asked—they are not open, however, to the trade with the exception of specially invited representatives.

The various cities scheduled for conferences extend from coast to coast and each has been chosen because of its central location.

Further information may be obtained by addressing the Truck Owners' Conference, Inc., 327 So. La Salle St., Chicago.

Concrete Ships.

By Arthur Brisbane.

THE business of making concrete ships calling for ground lime rock and very little steel ought to be a big business—but it evidently needs protection and the interest of the President of the United States.

The public is supplied with reasons why concrete ships cannot be and are not built in any great numbers—such "reasons" always arise to oppose a new idea.

The President will remember that when the ship of iron was first announced there was violent opposition to the new idea. The opposition came from the manufacturers of wooden ships.

They were quite sincere, probably, in their objections and in their tearful protest that the sailors "should not be sent across the ocean in iron pots to drown them."—Chicago Herald-Examiner.

BE SURE to send Pit and Quarry right along. We read every inch of it. —H. Held, Manager, New Ulm Stone Co., New Ulm, Minn.

Pit and Quarry

Rand-McNally Bldg., Chicago, Ill.

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The War Service Committee.

THE War Service Committee of the stone and sand and gravel industries which has been appointed by the War Industries Board will have jurisdiction over crushed stone, sand, gravel and slag used in concrete work, road work and ballast, but not over stone for fluxing, chemical or agricultural uses. As a result of the conference which called the committee into being, it is stated, priority orders will be issued according to the following program:

Producers of fluxing stone will have a clear way, as their product is essential to the manufacture of steel; ballast producers will also be given transportation facilities, in order to keep railroad beds in proper condition; limestone used for fertilizer will be given as adequate facilities as possible, while materials used in road building will receive consideration when materials for other purposes are not demanding immediate shipment. Exception will be made for urgent road work, but for general purposes road building material will be given consideration after stone and gravel for other purposes mentioned have been taken care of.

This program, while more favorable to some producers than to others, will be accepted loyally by all. It certainly seems more reassuring than many expected. But, for weal or for woe, every sand and gravel producer as well as every stone operator will stand loyally by the government in the object which is the paramount desire of all—to win the war. The "War Service Committee on Mineral Aggregates"—that is the official title of the body chosen to act as spokesman for the sand, gravel and stone producers of the country—can do much in its advisory capacity to further this great aim. Representing two allied yet distinct industries, it will serve these industries best by placing ever foremost the interests of the nation.

Essentials in Wartime.

DR. A. N. DAVIS, the Kaiser's dentist, was one of the very last Americans to leave Germany. He reports in the Chicago Daily News that at the time of his departure, early in 1917, the German railroads were in a dilapidated condition and that as a result wrecks were frequent and one read constantly of terrible accidents to troop and passenger trains. This condition, it is believed, has much to do with the recent German reverses.

During war time the natural tendency is to make few or no repairs. That tendency is not confined to Germany, though the stress of conditions there makes any other course extremely difficult. It is well known that industrial and transportation

plants and public property go to pieces rapidly if repairs are not kept up. The government's control of American railroads cannot prove successful throughout the war period unless it systematically attends to the upkeep of roadbeds, rolling stock and terminals. Thus far there are hopeful indications that the railroad administration understands the importance of this great element of national strength.

What is said of the upkeep of railroads applies with equal weight to all other public highways. No scheme of labor and time conservation, no matter how well planned, can accomplish its full purpose without good roads.

North, South, East, West.

A PACIFIC COAST reader, commending the practical articles in this journal, writes: "We know from experience that there is a wide field open for the introduction of your latest Eastern improvements into our Western states."

This is the kind of spirit that PIT AND QUARRY wishes to stir up in the industries it serves. It augurs well for any section of the country when its business men believe they can learn much from the rest of the country. We agree with our reader, but we also believe that the Eastern states can learn much from the West.

Recently one of the editors of this journal visited a large sand and gravel bed in the East that has been worked for several years and found that only hand methods were used. Such procedure does not savor of the West. The editors of this journal believe the West is as progressive as the East and that one can learn from the other.

Another reader writes: "PIT AND QUARRY gives an idea in a few pages how the other fellows are running their places and we may make improvements to ours. . . . I have spent days going from city to city, hunting out sand banks to find new ideas and be disappointed."

This reader does not mean to intimate that he was unable to learn from others, rather that time was wasted in finding few new things in his travels, while at little expenditure of time by reading this journal he is able to glean much valuable information as to how others conduct their business, adopting all new ideas possible to his own. An array of methods and facts can be presented in a journal that would cost the individual much time and money to gather. It is in this way that the North, the South, the East and the West can learn from each other.

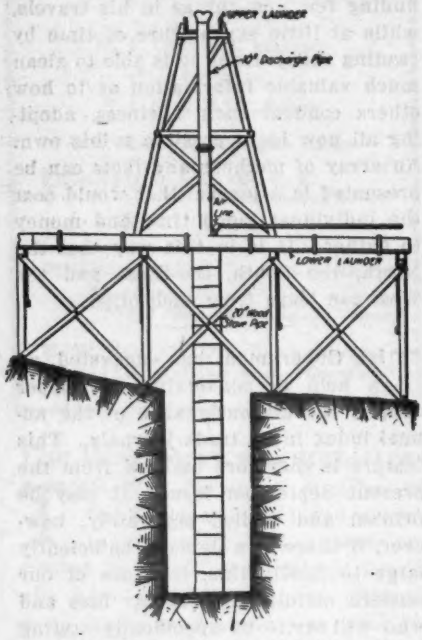
THE Government has suggested, as a help in conserving the paper supply, the discontinuance of the annual index in all trade journals. This feature is therefore omitted from the present September issue. It may be printed and mailed separately, however, if there is a demand sufficiently large to justify this, to those of our readers maintaining regular files and who will write us specifically stating that it is desired.

THE necessity of stronger and closer union by means of national organization was again emphasized at the Washington conference. All who attended realized as never before that the conditions brought about by the war, centralizing and nationalizing power and authority for the public good, demand also the coördination and coöperation of all industries.

NEVER before was organization so essential to any industry as now. In many vital matters affecting business the Government recognizes organizations only—not individuals.

Air Lift for Sand or Screenings

AN ECONOMIC air lift devised primarily to handle tailings from the mill of a copper company, but which could be similarly used for elevating sand, gravel, etc.,



An Economical Air Lift.

is thus described in the Engineering Journal:

Tailings from the mill of one of the largest copper companies in the Southwest are brought to a consistency of 4 or 5 parts of liquid to one of solid and allowed to flow by gravity through launders for about a mile, where they then have to be lifted from 15 to 30 ft. and carried over a dam into a settling pond or dump. About 7,000 gal. per minute of this mixture is handled, and three 10-in. centrifugal sand pumps, direct-connected to 150-hp. motors, were previously used. This method was found to be very expensive, as the tailings were sharp and cut out the casings and impellers of the pumps very rapidly, the average life of a pump not exceeding four days of continuous operation. Large motors were necessary, as the efficiency of the pumps dropped readily to a low point as wear occurred.

To obviate these difficulties, an air-lift system was installed and has proved a solution of the problem. At various points in the lower launder, openings were made discharging each into a 20-in. wood-stave pipe, which was set in a pit a sufficient depth to give proper submergence and closed at the lower end. Inside of this a 10-in. discharge pipe, fitted with a foot-piece, is placed, through which air is introduced at the bottom and which discharges directly into the upper launder. This pipe has no bends and no obstructions inside, so very little wear can occur and renewal will be practically unnecessary. Three of these installations are able to handle the maximum tonnage. A separate compressor, driven by a 40-hp. motor, is used for each air lift, although all three could easily be handled from a central plant if local conditions made it desirable. Compressors and motors are housed and require little attention.

The Story of Lime.

This booklet, used as a factor in the effective educational campaign of the Columbia Quarry Co., St. Louis, tells convincingly and simply just what every farmer ought to know about lime and its uses. The author is D. Howard Doane, formerly professor of farm management at the University of Missouri. His style and his manner of telling the story make the subject doubly interesting, and the book will do much to dispel the popular delusion under which many still labor that the only agricultural function of lime is simply to sweeten the soil.

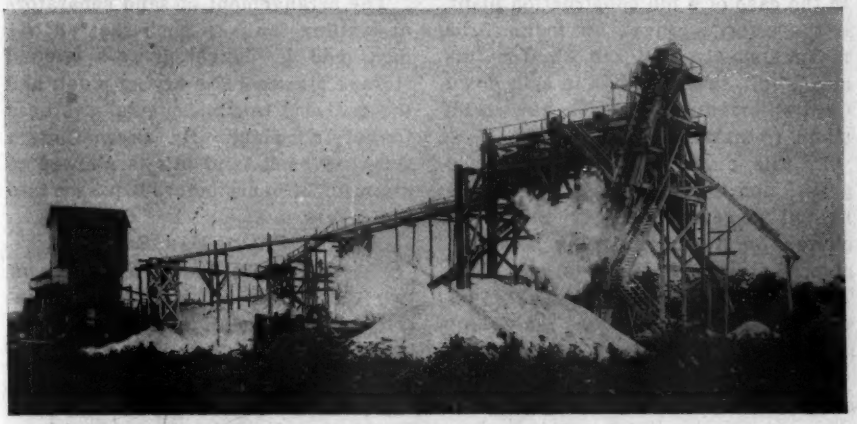
Taken on Trust.

"Our product is thoroughly tested before leaving the factory. No man can sell stuff today that has not been tested."

"We manage to sell our product without testing it."

"That's odd. What do you sell?"

"Dynamite."—Brooklyn Citizen.



Finished Product Storage (Left) and Washing Plant (Right). Note the Sand Separator and Ground Storage between the Two Plants.

Absecon Plant is Binless

Ground Storage Method Avoids Plant Shutdown Where Call for Sizes Is Uneven or Some Grades Are Slow in Moving.

THE ABSECON Sand Co., Absecon, N. J., has recently completed a plant which, through its differences from the usual run of plants for the same kind of work, should be of interest to the trade in general. The company produces a high grade of pebbles and sand for concrete work, and in addition turns out four kinds of sand-blast sand, which help to supply an active demand for this comparatively scarce product.

The land on which the plant is located is approximately level, and the material is dug by a locomotive crane of standard gauge, with a 50-foot boom and grab bucket. A dinkey engine and three-yard cars carry the load to the plant, where it is dumped into a large steel-lined hopper, delivering to a low-speed perfect-discharge elevator. The elevator is equipped with steel chains, with manganese steel pins and bushings, which run over chilled wheels. From here the material passes through a duplicate set of Gilbert type screens, which reject the large and small pebbles and torpedo gravel and deliver to the separators and to storage piles of coarse and fine sand. In order to wash the larger pebbles completely, to meet the requirements of concrete specifications, a gravel scrubber is also used at the rejection point of the first pair of screens.

Trestle Supports Washing Equipment.

The washing plant, with its sand separators or settling tanks, is unique in having no storage bins. The machinery, screens, etc., are mounted on a trestle work about 50 feet high, and all storage of materials is in the form of ground storage, which, when required, can be reclaimed and loaded to cars with the locomotive crane.

The advantage claimed for this type of plant over the usual bin construction is its elasticity; in other words,

in the case of a bin construction plant, if the torpedo gravel, for instance, is moving slowly, and the bin for this size is full, the plant has to shut down until shipments of torpedo have been made, to make room for more.

In this plant the pebbles, torpedo gravel and concrete sand can be delivered direct to cars by means of chutes, or, by the throwing of a flap gate, delivered to the storage piles. The amount of ground storage available immediately under the plant amounts to over 25,000 yards.

Steam power is used, a single engine and two boilers supplying the power necessary to drive the elevator and turn the screens and also to operate a steam-driven pump which circulates the washing water. This equipment has a capacity of 120 tons per hour, and the arrangement of the machinery is simple, with the fewest number of moving parts, to reduce the cost of maintenance.

The arrangement of sand separators or settling tanks is such that on one day sand is delivered to a ground storage pile near the drying plant, and the next day to another pile, also near the drying plant. By alternating in this way each sand pile is allowed to drain for 24 hours before it passes into the dryers.

Drying Plant Has Six Bins.

The dryers are loaded by means of two Clark type power shovels delivering to two small elevators, which, by proper proportion of the buckets, put into each dryer the correct amount of sand for the capacity of the plant. The dry sand passing from the dryers is elevated by a centrifugal discharge elevator to a combination of Reinert vibrating screens, which separate the sand into numbers 1, 2, 3 and 4 standard sand-blast sands, and also take out the fines, which are used for engine-sand and similar work.

The finished product is kept in a

View of the Three Sand Separators and the Flumes Which Lead to Them, Located on Trestles Above Storage Piles.

Material is Dug by a Locomotive Crane and Hauled to and Discharged into a Large Steel Lined Hopper at the Washing Plant.

water-tight building, in ground-storage bins, six in number, from which three elevators, operating independently, again pick up the finished sand and deliver it to the doors of box cars in which it is shipped.

The general arrangement of the plant in regard to tracks, sidings, etc., is such as to insure, for years to come, the digging of material with a minimum of shifting of track, and at the same time the grading of the tracks is such as to allow the crane or the dinkey to move all loaded and empty cars independently of the railroad shifting engine. This plant was designed and equipped by the Link-Belt Company, of Philadelphia.

Hay and Tar Mats for Sand Roads.

In the sand sections of Michigan the pure sand roads have given much trouble in dry weather and were often impassable in winter. State Highway Engineer Hirst conceived the idea of making a mat of hay and tar and an experimental mile of roadway was so made, being divided into twelve sections each constructed somewhat differently from the others. The experiment is being watched with considerable interest, but as yet no conclusions have been drawn as to the merits of this type of construction.

Space permits mention of only one section, No. 1, a particularly bad stretch 1,000 feet long containing 200 feet of 8 per cent grade. It was first covered with a layer of marsh hay and then a ⅝-gallon application of cold Tarvia "B" was put on. A second layer of hay and a ½-gallon treatment followed. More tar was used on the hill than elsewhere. A 1-inch layer of sand was then spread over the entire road. A ton of hay covered about 350 square yards.

Proposed Test for Road Rock

A REVISED test on the toughness of rock, as recommended by the Committee on Road Materials, was submitted to the American Society for Testing Materials at its 1918 convention, held at Atlantic City. Criticisms will undoubtedly be forthcoming, and from these will be prepared the final recommendations. Suggestions and criticisms may be addressed to Logan Waller Page, director, Office of Public Roads and Rural Engineering, Washington, D. C. The revision of the standard test for toughness was undertaken as the result of nine years' routine testing and considerable investigation. The revised form gives more complete directions for making the test and aims also at more serviceable results for judging the relative toughness of different rocks. Following is the full text of the proposed test:

1. Definition.—Toughness, as applied to rock, is the resistance offered to fracture under impact, expressed as the final height of blow required of a standard hammer to cause fracture of a cylindrical test specimen of given dimensions.

2. Sampling.—Quarry samples of rock from which test specimens are to be prepared shall measure at least 6 inches on a side and at least 4 inches in thickness, and when possible shall have the plane of structural weakness (which may in certain cases be the rift, cleavage, or bedding plane) of the rock plainly marked thereon. Samples should be taken from freshly quarried material, and only from pieces which show no evidences of incipient fracture due to blasting or other causes. The samples should preferably be split from large pieces by the use of plugs and feathers and not by sledging. Commercial stone-block samples from which test specimens are to be prepared shall measure at least 3 inches on each edge.

3. Size and Form of Test Specimen.—Specimens for test shall be cylinders prepared as described in Section 4, 25 mm. in height and from 24 to 25 mm. in diameter. Three test specimens shall constitute a test set. The ends of the specimen shall be plane surfaces at right angles to the axis of the cylinder.

4. Preparation of Test Specimens.—One set of specimens shall be drilled perpendicular and another parallel to the plane of structural weakness of the rock, if such plane is apparent. If a plane of structural weakness is not apparent, one set of specimens shall be drilled at random. Specimens shall be drilled in a manner which will not subject the material to undue stresses and which will insure the specified dimensions. (The form of diamond drill described in Bul. No. 347, U. S. Dept. Agriculture, pp. 6-7, is recommended, and should prove satisfactory if the instructions are strictly followed.) The ends of the cylinders may be sawed by means of a band or diamond saw (a satisfactory form of which is described in Bul. No. 347, U. S. Dept. Agriculture, pp. 7-9), or in any other way which will not induce incipient fracture, but shall not be chipped or broken off with a hammer. After sawing, the ends of the specimens shall be ground plane with carborundum or emery on a cast-iron lap until the cylinders are 24 mm. in length.

5. Impact Machine.—Any form of impact machine which will comply with the following essentials may be used in makng the test:

(a) A cast-iron anvil weighing not less than 50 kg., firmly fixed upon a solid foundation.

(b) A hammer weighing 2 kg., arranged so as to fall freely between suitable guides.

(c) A plunger made of hardened steel and weighing 1 kg., arranged to slide freely in a vertical direction in a sleeve, the lower end of the plunger being spherical in shape with a radius of 1 cm.

(d) Means for raising the hammer and for dropping it upon the plunger from any specified height from 1 to not less than 75 cm., and means for determining the height of fall to approximately one millimeter.

(e) Means for holding the cylindrical test specimen securely on the anvil without rigid lateral support, and under the plunger in such a way that the center of its upper surface shall, throughout the test, be tangent to the spherical end of the plunger at its lowest point.

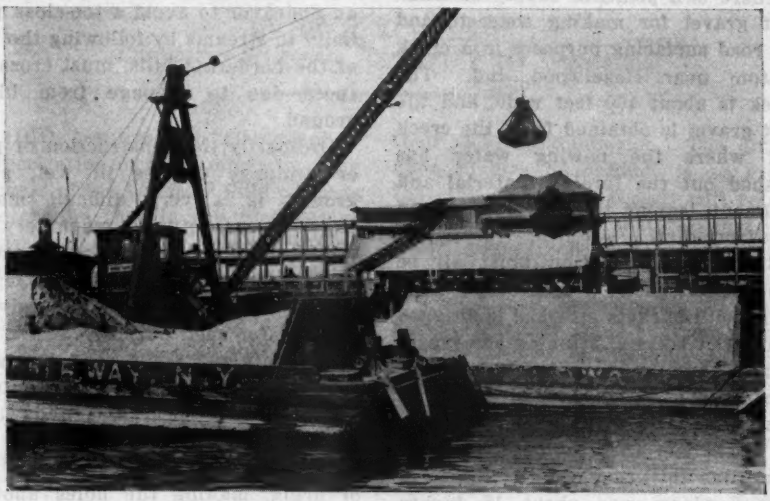
6. Method of Testing.—The test shall consist of a 1-cm. fall of the hammer for the first blow, a 2-cm. fall for the second blow, and an increase of 1-cm. fall for each succeeding blow until failure of the test specimen occurs.

7. Recording and Reporting Results.—The height of the blow in centimeters at failure shall be the toughness of the test specimen. The individual and the average toughness of three test specimens shall be reported when no plane of structural weakness is apparent. In cases where a plane of structural weakness is apparent, the individual and average toughness of the three specimens in each set shall be reported and identified. Any peculiar condition of a test specimen which might affect the result, such as the presence of seams, fissures, etc., shall be noted and recorded with the test result.

PIT AND QUARRY is a valuable magazine for anyone engaged in the sand and gravel or crushed stone business.—Babcock & Willcox, Kasota, Minn.

PIT AND QUARRY brings to me ideas which I am interested in.—H. M. Johnson, Gadsden, Ala.

Three Men Do Work of Twenty



IN NEW YORK CITY the handling of sand, gravel and crushed stone has undergone a change in method that results in saving much time, labor and expense. From the various gravel pits sand is transported in flat-bottom scows to the docks. This material, together with crushed rock and gravel, used to be unloaded from the boats by men who filled wheelbarrows, then pushed them over planks leading to the street where the material was dumped, to be again shoveled into wagons and hauled away. It took 20 men (the number that could work to advantage) one day to unload one boat and dump it into the street, at a cost of 15 cents a yard.

The new method consists of a floating Lambert derrick and Mead-Morrison scoop bucket, operated by a Lidgerwood boiler, which take these materials from the boat and place them in hoppers erected at the dock, one hopper being used for each kind of material. One man operates the scoop bucket and derrick, one attends the gates of the hoppers, letting the materials into motor trucks as they are stationed underneath each hopper, and the other man gives out load tickets to drivers —three men thus doing the work formerly performed by twenty. By this new system a load of sand may be placed in the hoppers in four hours at a cost of 5 cents per yard. If the hoppers are not emptied as fast as the material is removed from the boat the street may be used to store the sand or gravel and the scoop bucket is used to place all the materials in hoppers as fast as needed. Crushed stone is unloaded at an expense of 7 cents per yard, its cost by the old way being 25 cents per yard.

Creek Gravel Excavation.

By J. V. Bradley.

There is a plentiful supply of excellent gravel for making concrete and for road surfacing purposes in a creek bottom near Hazelwood, Ind. The creek is about 100 feet wide, and the best gravel is obtained from the creek bed where the flowing water has washed out the foreign material and sediment, leaving the gravel clean and free from dirt.

Since the excavation must all be done under water, a good heavy drag chain with buckets attached is dragged across the bottom, bringing the gravel up and dumping it. It was found that at a depth of about six feet there was a layer of hardpan in which the buckets would jam and stop operations for some time until they could be loosened. This hardpan was about 18 inches thick, and was underlaid by good gravel; but as the buckets would not penetrate it, only the gravel above the hardpan was used.

Dynamite Removes Hardpan.

Though not in charge of the work, I suggested that I be allowed to try the effects of dynamite for loosening the chain and buckets after they had become jammed in the hardpan about six feet under water. Accordingly, I obtained some Red Cross dynamite and made up several one-cartridge primers with a cap and about a foot of fuse for each cartridge. These were lighted and dropped into the water at 10-foot intervals along the chain, while at the two ends, where the hardpan seemed to be the strongest, two cartridges tied together were used.

The machinery was then started up, and the chain was found to be free, the buckets coming up full. The blasting had not only loosened the chain and buckets, but had broken up the hardpan and loosened the gravel, so that every bucket worked to capacity.

Good Road Drainage.

Many of our roads must of necessity be built across low spots or, in an endeavor to avoid a too-close proximity to streams by following the edge of the bordering hills, must cross wet spots due to seepage from higher ground.

Ordinarily the construction of proper drainage ditches in wet, soggy ground is a very difficult matter. Horses, tractors, and machinery can seldom be used on account of getting mired in the mud, and hand labor is entirely too scarce and expensive to be used for such purposes.

One very successful road contractor uses large amounts of dynamite in general road work, and finds it of great assistance in ditching these wet spots. He uses the electrical method of firing, making the holes about 6 inches shallower than the grade line desired, and placing them about 30 inches apart along the center line of the proposed ditch. The charges of dynamite are primed with an electric blasting cap, placed in the holes, and well tamped. The electric cap wires are connected up in series and fired by a blasting machine. In this manner the entire line of charges explodes at the same instant, lifting the dirt high in the air and scattering it over the surrounding land, thus doing away with high banks of earth along the ditch.

He has become so successful at this kind of work that by proper loadin there is no hand work to be done after the blast, as the ditch is left clean and clear of all debris, ready for immediate use. A ditch averaging 4 feet deep and 8 feet wide on top can be made in this manner without the aid of a shovel of any kind. From 1 to 1½ pounds of 40 per cent low freezing dynamite per hole is sufficient loading for this size of ditch in heavy soil.

Standard Sizes of Crushed Stone

From the Standpoint of the Crusher Operator.

BY W. R. SCHERER
Secretary, Wisconsin Crushed Stone Association

IT DID not need an elaborate investigation of the subject by engineers of the Office of Public Roads to determine that in the methods of designating sizes of crushed stone there was "confusion worse confounded." It was well known before the publication of their recent report in the June number of Public Roads. The factors that cause variation in product when the size of screen openings is constant are just as well known to quarrymen. For the sake of clearness, and if we want to really define sizes of stone, these factors must be considered.

To define a grade of stone, all are agreed that size of screen openings through and over which the material passes must be stated. When these are stated the product may still vary from several causes.

1. There is an appreciable difference in the product of round and square perforations. A hole described as 2 inches square will pass a larger stone than a round one 2 inches in diameter. Square perforations are still used, though to a very small extent, except in fine screens. It would be safe to confine the question to circular holes. Where square perforations are retained, they must be made the equivalents of circular openings.

2. It makes a noticeable difference in the product whether screens are stationary or revolving. On a stationary screen the stone particles slide over the surface; they are held on their longest dimension. In a revolving screen the stones roll and can and do go through holes no larger than their smallest dimension. The difference in size of product is so great that the stationary screen will retain 20 to 40 per cent of material that has been passed through a revolving screen of the same size perforations.

This means that the specifications still retained by some engineers, naming the largest dimension as the determining one, is not practicable, since stationary screens are almost unknown in the industry. If engineers knew this they might discontinue the practice. They could guard against "slivers" by other means.

3. It makes a difference, of course, whether a screen of any type is overloaded or not. More often it is the large plant that has inadequate facilities for separating the sizes. Fines are carried over to the next section having larger openings. Thorough screening should be understood in designating sizes, and how thorough it should be will be discussed in another paragraph.

Now, then, to get clearness in the matter of describing sizes: Let us describe a given product at least technically by the size of perforation which it passed through and the size of perforation that held it, and let us understand thoroughly that the figures are for a round perforation, for a revolving screen and for a screen of sufficient capacity for the plant.

Nomenclature.

And if we can best describe a given product by maximum and minimum smallest dimension, for technical purposes, why not for all purposes? Why should there be the conflicting nomen-

clature of numbers and more or less descriptive names? In fact dimensions are the one description that now is universally intelligible, and it would seem that for all practical purposes—ordering stone, or specifying, invoicing and all—it is just as easy to refer to 2″-1″ stone as it is to write or talk about No. 23 or medium fine stone.

Probably the best established and most universal system of nomenclature is that of the granite crushers both east and west, where No. 1 stone is always very nearly 2¼″1½″ and ¼″ and finer is called No. 4. It would be very difficult to accustom the granite trade to another system of numbers while they could be led to adopt the figures limiting the sizes.

Limiting the Number of Grades.

Once we have means of describing grades of crushed stone—and it would seem that with the above understanding 2″-1″ stone or any other size would mean the same thing everywhere—a further understanding could be arrived at, between the producers on the one hand and road builders, engineers and architects on the other hand, as to grades that should be offered by the former and demanded by the latter.

The advantages to the crusher operators, if the number of grades can be reasonably limited, are manifest. There can be no question that there has been on the part of engineers—less of road engineers than of the specialists in structural concrete—considerable academic dogmatism about sizes for certain purposes. They have been just "finicky." But—and this is from the quarryman's standpoint as well as the engineer's—results must be considered. It is to the quarryman's interest—and some of them can see it—to furnish just the size that will give the best results. It is incumbent on all parties interested to ascertain how much of this fastidiousness is justified and in how far the results in road or concrete are affected by a slight variation from the size demanded by some engineer whom the quarryman thinks pedantic.

The Demands of Engineering Practice.

Here are some thoughts, from the standpoint of the quarry operator who is interested in results, which it is hoped may illuminate the subject. On the one hand, some paving engineers using stone in a special process of asphaltic concrete paving have insisted on a product passed through a screen ⅛ inch larger or ⅛ inch smaller than was commercially produced. This seems to be pedantry that passes for scientific aggregating. In stone above 1 inch one-eighth inch more or less can make no possible difference; even a quarter inch variation seems unreasonable in 1-inch and larger stone. The demand for such variations can be eliminated.

On the other hand quarrymen are at fault when they fail to recognize the imperative necessity for good screening. And here is where they should consider results. Stone for macadam must be distinguished from stone for concrete, and differently prepared. It makes no difference what the hardship on the quarryman may be, results to a certain extent justify the sacrifice.

The distinction can be simply stated in this way: In macadam stone there must be a large percentage of voids, while in concrete stone this percentage must be as low as possible. To elucidate, no road-builder can bind a crusher-run stone. Fines, when present in coarse stone, close the interstices and prevent the entrance of the binder even when that binder is hot tar. How much more must these fines prevent the entrance of stone screenings in water-bound macadam. In penetration macadam, road-builders

have had to discontinue the practice of dumping loads of the top-course stone on the base, because, as the load is spread with shovels, the fines remain on the spot. The stone "mats;" the binder, instead of covering each stone, spatters on the mat; the binder does not anchor in the body of the course, and a bald spot results. A large percentage of failures of "poured macadam" are due to poor screening. Fines should not be tolerated at all. The engineers of the Office of Public Roads suggest a maximum of 15 per cent, but 10 per cent should be the limit; 0 per cent should be aimed at.

There is no "finickiness" about demanding good screening for macadam. Not only should the fines be removed, but the range of sizes in any one grade should be as restricted as possible for macadam stone and as wide as possible for concrete work. Thus for macadam top course, 2″-1½″ stone is better than 2″-1″. The former, being more even-sized, has more voids, and voids are what is wanted.

SCREENING CONCRETE AGGREGATES.

On the other hand concrete aggregates must have a minimum of voids; the greater the range of sizes the better the results. Stone ranging in size from 2″-1½″ has 50 per cent of voids. To make a dense concrete one-half of the concrete must be mortar, or a mixture of cement and fine aggregates. Well-graded stone ranging in size from 2 inches to ¼ inch, when intimately mixed, has 35 per cent of voids or less, leaving just that percentage to be filled with mortar. The efficiency of the cement in the latter case is increased from 35 to 50, which means over 40 per cent.

The proofs for this are abundant. Whenever and wherever coarse aggregates have been tested for the compressive strength of the resultant concrete the well graded samples have stood the highest test. In fact, from the vast number of experimental tests of fine aggregates, in which investigators all over the world have used three sizes, designated as fine, medium and coarse, plotting their results on what is known as the Feret triangle, it is evident that 70 per cent of the largest size permissible, 20 per cent of the medium, and 10 per cent of fine results in the best concrete. Why should not engineers insist that not less than 25 per cent nor more than 50 per cent of, say, a 2″-¼″ concrete aggregate shall pass a 1-inch ring, and why should not quarrymen be prepared to furnish it?

Again this is not pedantry. Why! A concrete made of all 2-inch stone and an ungraded sand is an absolute failure; it is full of voids and can be worked only with a detrimental excess of water. A great deal of similar concrete has gone into bases of pavements, and it is to be wondered at that there are not more failures. This specification would be no hardship on any crushing plant. It is not necessary that the two or three sizes required be mixed in a bin; they can be loaded on the cars or trucks one over the other, and would be mixed in unloading, at least in the case of cars unloaded by shoveling. Mixing in bins is undesirable for another reason: A bin full of mixed sizes does not stay mixed. There is the well known separation by gravity, the large pieces always rolling to the outside of the pile. If the bin is large enough a rather close separation can be obtained by gravity.

These, then, are concessions which quarrymen must make for the sake of results—thorough screening in macadam stone and thorough mixing in concrete stone, both within reasonable limits. That state testing engineers and chemists are willing to concede the ridiculous fractional sizes is apparent from their preliminary report, Department of Agriculture Bulletin No. 55. They recommend the follow-

ing screen perforations: 3″, 2″, 1″, ½″ and ¼″. The nomenclature proposed consists of the numbers 3, 2, 1, ½ and 0, corresponding to the largest size contained in the grade. Thus No. 3 stone is 3″-2″. Combinations of the numbers are proposed thus: No. 1-2-3 means a mixture of ½″, 1″, 2″ and 3″. From the fact that this system of designating grades is the very contrary of the only system that has been at all firmly established in any branch of the industry, that of the granite quarries, it does not seem likely that its adoption universally could be successfully urged.

The logical system of describing grades seems the only one which we could hope to see adopted, that of specifying the limiting sizes. In this system stone for macadam base course would become 3″-2″ instead of No. 3 as is proposed, or instead of "ballast," "macadam," "2″ stone" or "3″ stone," as is now the confusing practice in different localities. Stone for cement concrete wearing surface would be simply 2″-¼″ instead of No. 12, as is proposed; ½″ screenings would become "½″ and finer." There can be no doubt that the nomenclature would be universally intelligible, and, with the restrictions mentioned above, would be accurate.

The First Conference of State Testing Engineers and Chemists evidently considered only road work. The requirements of structural concrete must be considered, and this will probably add another screen and grade—1½″ round perforations. This will not be seriously objected to by crusher operators. 2″-1½″ stone for second course macadam will give very much better results than 2″-1″. For concrete 1½″-¼″ material is vastly better, is as easily worked and will be more acceptable even for reinforced work than 1″-½″.

The adoption of standard sizes is possible. The action of the Office of Public Roads and Rural Engineering in inaugurating a movement to bring this about is to be highly commended. Their engineers have shown a disposition to meet the producer more than half way. If, in addition, other interests are considered, possibly the American Society for Testing Materials, the quarryman who has conformed his screening plant to the standards prescribed would have the highest engineering authority to protect him from the whim or caprice of pedantic roadbuilders and engineers, and other engineers, on their part, would be assured of getting what they specify. To recapitulate:

I. The establishment of standard sizes of crushed stone adopted throughout the states is possible and highly desirable.

II. To accurately define a grade of stone, screen perforations through and over which it passed should be given. It should be universally understood that (1) circular perforations are meant, (2) that the screen is a revolving one, and (3) that the screening plant is adequate so that any one grade shall contain not more than 10 per cent of fines (possibly 5 per cent) and not over 5 per cent oversize by laboratory tests, and that (4) a mixture of various grades, such as 2″-¼″, shall contain not less than 25 per cent nor more than 50 per cent of fines passing through a 1-inch screen, that is, through perforations having ½ of the diameter of the maximum sizes permitted in the mixture.

III. The following screen sections are proposed: 3″, 2″, 1½″, 1″, ½″, ¼″.

IV. The nomenclature should be the logical one, simply stating maximum and minimum sizes.

PIT AND QUARRY is the first along its line, and we are pleased to receive a copy of each number, as the contents of your paper are very interesting and helpful.—The Cleveland Stone Co., Cleveland, Ohio.

The Highway to Freedom

By John S. Bleecker

At a banquet given recently, at Columbus, Ga., in behalf of the Dixie Overland Highway, a coast-to-coast project, President Bleecker of the Dixie Overland Highway Association read these lines, which are from his own pen. They impressively demonstrate the importance and necessity during the war of a nation-wide system of highways.

WHEN Germany, with brutal trend,
On Belgium's soil first trod,
She used the highways of a friend
To violate the laws of God.

She marched her armed legions thru
The roads that led to France,
While all the world, as horrors grew,
Watched her as in an awful trance.

But Belgium, French, and English troops
Threw back this Kultur crew,
By sending auto loads in groups
Of strong and fearsome men who do.

And Paris, as we know, was saved
By road and auto truck,
So that the vile, base, and depraved
Bill Kaiser could not run amuck.

If we would keep our own fair land
Free from the frightful Hun,
We'll build our bridges so they'll stand
The greatest weight of any gun.

We'll build paved highways, straight and smooth,
For boys in khaki all,
Who over land to sea will move,
And quickly answer Freedom's call.

Road Work for 1919.

A GENERAL PLAN for carrying on road building and maintenance during the progress of the war is being formulated by the United States Highways Council. Indications are favorable for a greater amount of work being done in 1919 than during the past year. A bulletin designating the classes of roads that will be authorized is being prepared by the Council, which will, it is hoped, soon be available for distribution.

Poor City Roads.

County roads in many instances are in better condition than the streets of the towns through which they pass. Municipal authorities plead lack of funds when they are called upon to improve the main streets of the town. To correct this condition, a constitutional amendment has been introduced in the Missouri General Assembly authorizing cities containing not more than 30,000 nor less than 2,000 inhabitants to issue bonds, in a sum not exceeding 5 per cent of the assessed valuation, for defraying all or any part of the cost of paving, macadamizing, grading or otherwise improving the roadway of any street, avenue or alley within the corporate limits.

Concrete Freight Cars.

The concrete freight car is soon, it is said, to supplement the concrete ship in steel conservation. At least the M. E. White Paving Co., of Chicago, is already at work building an experimental gondola car, 40 feet long, with a capacity of 50 tons, the entire body to be of reinforced concrete. It will require only 3 tons of steel as against 16 tons in an all-steel car, and the cost will, of course, be much less.

WE consider Pit and Quarry very helpful and useful.—E. H. McEwen, Superintendent Marblehead Lime Co., Louisiana, Mo.

We find Pit and Quarry most interesting and helpful. We always refer to it when buying equipment.—R. R. Gwathmey, Jr., General Manager, Mercier & Miller, Inc., Richmond, Va.

Pit and Quarry is not only helpful, but very interesting.—E. E. Lepine, Manager, Standard Lime Co., Ltd., Joliette, Canada.

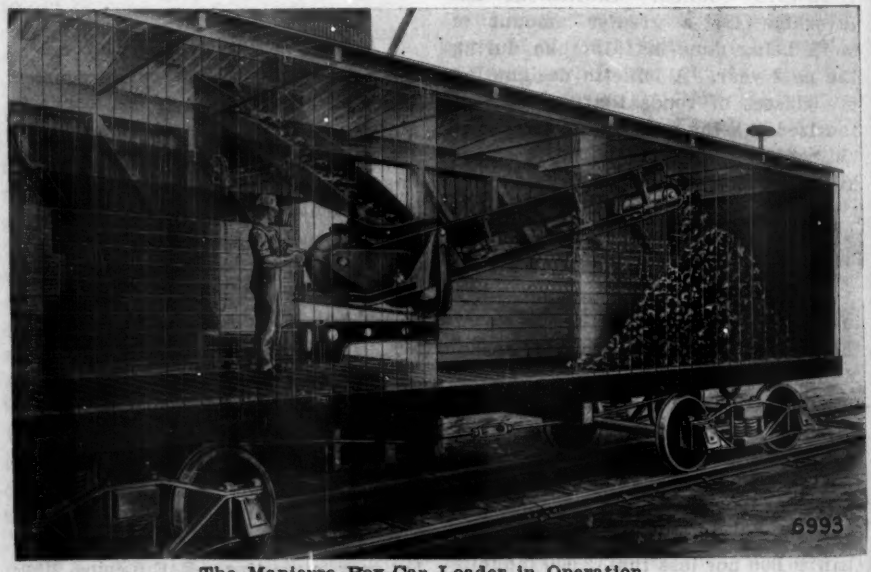
MEN AND MACHINERY

Box-Car Loading.

THE ever-increasing difficulty of getting and keeping labor makes the loading of box cars by hand more and more impractical. The very nature of this work—stacking and piling material back in the ends, trying to make speed and at the same time get a full load in the car—makes it, especially in warm weather, very objectionable to the average workmen, and machinery to do away with this trouble has been gladly welcomed.

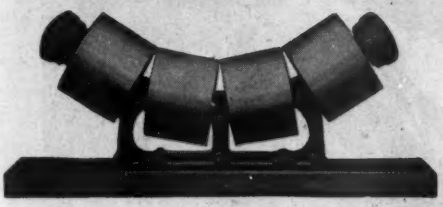
The Manierre box-car loader, sold by the Link-Belt Company (New York, Philadelphia and Chicago) and illustrated herewith, solves this problem both where speed is required and where material must be handled with a minimum amount of breakage. The pivoted belt conveyor is motor-driven and can be swung in the car with but one man, who tilts the belt, to form the correct size and distribution in the car. The belt can be run at various speeds for handling material, such as lump lime, at a minimum speed, to avoid breakage, or can throw bulk material back into the ends of the car, using a higher speed on the belt. This machine is worked out in very careful detail, using ball bearings wherever necessary, so that, while very heavy and substantial, it is easily controlled by one man.

For smaller plants, where the capacity is lower, or where the speed of loading cars can be such as to warrant it, a smaller machine, called the Pratt box-car loader, has been devised. It consists essentially of a short belt conveyor with cleats riveted to the belt and operated at high speed. It is driven by a gasoline engine or motor, and the whole frame is mounted on wheels so that it can be easily



The Manierre Box-Car Loader in Operation.

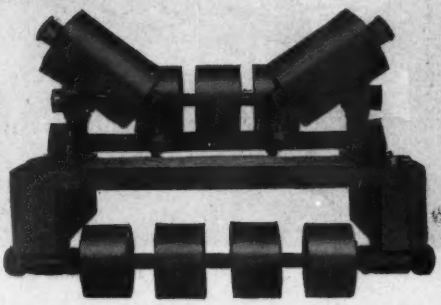
CALDWELL CONVEYORS

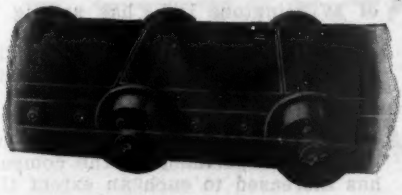


BELT CONVEYORS

Simple in design, economical of power, they give satisfaction. Different styles to suit your requirements.

A rough sketch showing conditions to be met at your plant, with capacity desired and power available, will bring our recommendations.





APRON OR PAN CONVEYORS

Flights or pans made of steel or cast iron, fitted to steel bushed self-oiling roller chain — complete with drives.

SCREW CONVEYORS

Steel "HELICOID" or Sectional flight screw conveyor for washing plants. We also make cast iron Screw Conveyors.

See Catalogue No. 38 for complete line of

Elevating, Conveying and Power Transmitting Machinery

H. W. CALDWELL & SON COMPANY
CHICAGO
Western Avenue, 17th and 18th Streets

The Pratt Box-Car Loader.

moved around. As can be seen from the cut, the machine receives from a chute in the door of the box-car, with a small hopper. The material falling on the high-speed belt is given a throw, and with the velocity thus imparted it is carried back into the ends of the car, without any hand-trimming whatever. It has been found possible to load a 40-ton car with glass sand without any hand labor whatever except moving the loader around when one end of the car is filled. This machine is suitable for handling glass sand, blast sand, fertilizer, ground limestone, and other fine bulk material not damaged by throwing. A capacity of over one ton a minute can be taken care of in handling material of the weight of sand, and other materials in proportion.

Du Pont Advertising Division Moves.

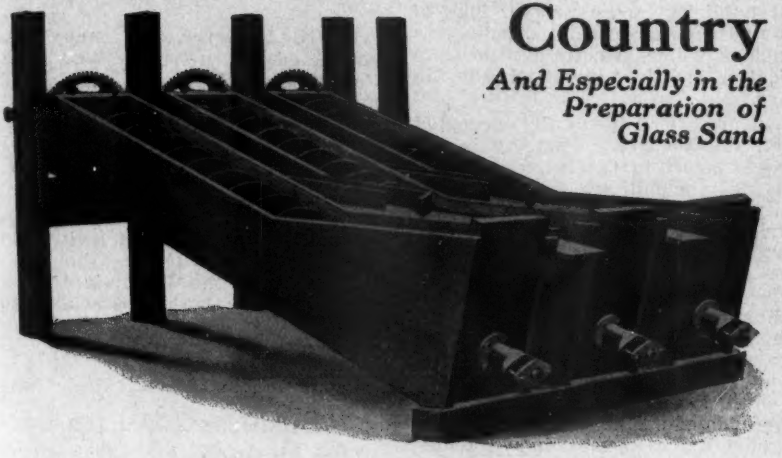
EVER to the forefront in displaying initiative and progressiveness, E. I. du Pont de Nemours & Company, of Wilmington, Del., has sprung an innovation in advertising circles by equipping an immense office building solely for the use of its advertising division. Through the expansion of its varied lines and the acquisition by purchase of a number of allied industries this department of the company has increased to such an extent that from a payroll of eleven people in 1911 it has grown until it now numbers a force of two hundred advertising experts and assistants, under the able direction of George Frank Lord, the company's director of advertising.

Kaiser Wilhelm's subsidized press has devoted considerable space of late to gloating over the alleged abandonment of foreign advertising and curtailment of home advertising by American manufacturers. The Du Pont Company, however, is one to which the stricture of the Kaiser's press does not apply. Instead of reducing its advertising expenditures the Du Pont Company doubled its appropriation for the present year over that of the previous year and is planning to increase the sum still further for 1919.

The courageous action of the Du Pont Company at a time when business conditions bordered on the chaotic served no doubt as an inspiration

Used in Some of the Largest Quarries in the Country

And Especially in the Preparation of Glass Sand



LEWISTOWN

Sand Washers

These are reasonably priced, well built, compact outfits, which can be easily and quickly installed. They are simple in construction and efficient in operation. Extensively used in the manufacture of glass sand which is so much needed today in the making of optical lenses for field glasses, telescopes, etc., required by the Government.

If you are not acquainted with Lewistown equipment and service, it will pay you to look into it.

We are in position to assist you solve your problem of whatever nature, if it pertains to crushing, grinding, screening, washing, drying and conveying, as we manufacture a full line of this machinery and equipment. Drop us a line stating what you desire information on.

Lewistown Fdy. & Machine Co.

LEWISTOWN, PENN.

to other great concerns which have since been following in the Du Pont footsteps and are keeping their names and products constantly before the public eye.

Another important feature of Du Pont publicity is the pioneer idea of group advertising of related industries —an idea which is certain to become typical of American advertising in the future.

Contrary to a generally accepted belief, the Du Pont Company is not engaged solely in the manufacture of industrial and military explosives. In reality it is the greatest diversified industrial enterprise in the world. It manufactures more than a thousand peace products which are widely used in the arts, sciences, industries and the home.

The advertising aims of the company are directed toward furnishing the public with complete information and education as to the uses and proper methods of use of their multiplicity of products. In consequence the importance of the advertising division has increased in proportion to the growth and expansion of the company.

The Du Pont American industries and the advertising managers of the individual companies are: The Arlington Works, A. R. Kneale; Du Pont and Harrison Chemical Works, L. B. Steele; Du Pont Fabrikoid Co., A. H. Berwald; Du Pont dye works, S. F. Withe; Harrison and Bridgeport paint works, J. Coleman Bentley; industrial explosives, E. F. Carley; agricultural explosives, F. W. Wilson; sporting powders, Edmund Doremus. The Canadian advertising of the Arlington Company, Ltd., and the Du Pont Fabrikoid Company, Ltd., both of Canada, is in charge of J. M. Cane.

In addition to the industries named above the company recently acquired a large interest in the General Motors Company. The thoroughness with which the Du Pont Company applies itself to any proposition justifies the prediction that its venture into this field will have a marked influence on the future of the American automobile business.

Personal Mention

The Traylor Engineering and Mfg. Co., Allentown, Pa., announces the election of Samuel W. Traylor, formerly president, as chairman of the board; William J. Roberts, formerly vice-president and general manager, as president; and H. Battersby, formerly treasurer, as vice-president and treasurer.

A. Niedermeyer, for many years connected with the Worthington Pump and Machinery Corporation, most recently as works manager of the Snow-Holly Works of that corporation, at Buffalo, N. Y., resigned on May 31 to devote his entire time to enterprises of his own.

Henry Stroh, for the past ten years with the Elliot Frog and Switch Company, prior to which time he was associated with the Republic Iron and Steel Company, both of East St. Louis, has recently joined the sales force of the Walter A. Zelnicker Supply Co., St. Louis.

Business Literature

THE BRADLEY PULVERIZER CO., Boston, manufacturers of the Giant Griffin Mill and the Bradley Hercules Mill, are now sending out the 1918 American Cement Directory. It is issued in handy pocket size, flexible covers, and contains not only a full alphabetical list of all cement manufacturing concerns in the United States and Canada, but also a separate directory, alphabetically arranged, of their officers, superintendents, chemists and sales managers.

THE July number of "Webster Method," the attractive house organ of the Webster Manufacturing Co., Tiffin, O., is full of suggestive text and illustrations. While the installations of elevating and conveying machinery described in this number do not happen to include either stone or sand and gravel plants, these industries will find in them much that is valuable and interesting.

ZELNICKER'S BULLETIN, No. 246, just out, offers some decided bargains in tanks. It includes a wide range in tank requirements and is sent free to the trade. Write to Walter A. Zelnicker Supply Co., St. Louis.

CHRIS D. SCHRAMM & SON, Inc., Philadelphia, have just issued their General Catalog No. 18, with full descriptions and detailed illustrations of their standard lines of engines, compressors, pumps, hoists, mixers and general labor-saving machinery for construction work, road-building, shipyards, railroad and municipal improvements. Owing to the great demand of the government for copies, the limited edition will not permit of promiscuous distribution. Nevertheless the firm is anxious that those really interested in the purchase, sale or use of such equipment be supplied, and readers of PIT AND QUARRY who are interested should make prompt application for this useful reference book.